UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/722,700	11/25/2003	Loucas Tsakalakos	139081-1(GERD:0662)SWA	9948

41838 7590 05/19/2008

GENERAL ELECTRIC COMPANY (PCPI)
C/O FLETCHER YODER
P. O. BOX 692289
HOUSTON, TX 77269-2289

EXAMINER	
MCCRACKEN, DANIEL	

ART UNIT	PAPER NUMBER
1793	

MAIL DATE	DELIVERY MODE
05/19/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/722,700
Filing Date: November 25, 2003
Appellant(s): TSAKALAKOS ET AL.

Tait R. Swanson
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 2/28/2008 appealing from the Office action mailed 5/2/2007.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

5,973,444	Xu	10-1999
6,255,198	Linthicum	7-2001
5,157,304	Kane	10-1992

6,054,801	Hunt	04-2000
6,465,132	Jin	10-2002
6,911,767	Takai	06-2005
6,376,007	Rowell	04-2002
6,586,093	Laude	07-2003
5,406,123	Narayan	4-1995
2002/0198112	Paranthaman	12-2002

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 30, 35, 36, 38-40, 42-51, and 56-68 are rejected under 35 U.S.C. 103(a) as being unpatentable over USP 5,973,444 to Xu (Xu '444) in view of USP 6,255,198 to Linthicum (Linthicum '198).

As to claims 30, 38, and 40, Xu '444 discloses a field emission device comprising a substrate; a dielectric layer; a conductive layer (in the Xu '444 reference, the conductive layer is called a patterned gate metal film); and carbon fiber emitters (nanorods) (see abstract and column 5, lines 24-30, see also figure 1 and column 14, lines 40-43). As can be seen in Figure 1, Xu '444 discloses a cavity extending downwardly. Xu '444 teaches a conductive layer on top of the substrate (see column 6, lines 11-29, in particular lines 17-19). However, Xu '444 does not teach that the layer is an epitaxial layer.

Linthicum '198 discloses a microelectronic device having an epitaxially grown layer of 3C-silicon carbide on a converted (111) silicon layer. A layer of 2H-gallium nitride, which is dielectric, is then grown on the epitaxially grown layer of 3C-silicon carbide (see abstract lines 1-6).

It would have been obvious to one of ordinary skill in the art at the time of this invention to use an epitaxial layer (as in Linthicum '198) on the substrate of Xu '444 in order to take advantage of the reduced defects produced by epitaxial growth (see Linthicum '198, column 1, lines 54-60). The conductive epitaxial buffer layer is expected to remain.

As to claim 44, Xu '444 discloses a field emission device comprising a substrate; a dielectric layer; a conductive layer (in the Xu '444 reference, the conductive layer is called a patterned gate metal film); Xu '444 discloses a catalyst metal film (since the catalyst is metal, it will serve as a conductive platform) on top of the substrate; with carbon fiber emitters (nanorods) on the metal (see abstract and column 5, lines 24-30, see also figure 1 and column 14, lines 40-43). As can be seen in Figure 1, Xu '444 discloses a cavity extending downwardly.

With regard to claims 35 and 48, the substrate of Xu '444 can be an inorganic monocrystalline substance (see column 6, lines 33-35). Specifically, a silicon wafer can be used (see column 20, lines 12-14).

As to claim 42, Xu '444 discloses carbon fiber emitters having diameters of 20-100 nm (see column 19 lines 65-67).

As to claim 43, Xu '444 discloses carburized metal (referred to as carbon fiber emitters) (see column 9, lines 25-32). Xu '444 teaches a silicon carbide (see column 9, lines 30-31). Although Xu '444 does not disclose where the carburized metal is from, it would have been

obvious to use any of the metal oxides claimed in the present invention to provide the carburized metals.

As to claim 45, Xu ‘444 discloses a structure on top of the substrate, which can be a cone (see column 14, lines 22-32).

As to claim 46, Xu ‘444 teaches that the catalyst (the conductive layer) can be a transition metal, including molybdenum, platinum, palladium and niobium (see column 9, lines 26-39).

As to claim 47, Xu ‘444 discloses that the fiber emitter (nanorod) can be a carbide (see column 9, lines 25-32).

As to claims 50 and 51, Xu ‘444 discloses that the substrate can be a polycrystalline material or a glassy amorphous material (see column 6, lines 34-37).

As to claims 36, 39 and 49, Xu ‘444 teaches that any of the monocrystalline substances would work as the substrate (see column 6, lines 34-37). Therefore, it would have been obvious to one of ordinary skill in the art to select any of the monocrystalline substances for the substrate.

Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over over USP 5,973,444 to Xu (Xu ‘444) in view of USP 6,255,198 to Linthicum (Linthicum ‘198) as applied to claim 30 above, and further in view of USP 5,157,304 to Kane (Kane ‘304).

Xu ‘444 does not disclose that its field emission device can be used in imaging systems.

Kane ‘304 does teach that field emission devices can be used in imaging systems (see column 1, lines 12-24).

It would have been obvious to one of ordinary skill at the time of this invention to use the field emission device in an imaging system as suggested by Kane '304 as the same materials are being employed.

Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over USP 5,973,444 to Xu (Xu '444) in view of USP 6,255,198 to Linthicum (Linthicum '198) as applied to claim 30 above, and further in view of USP 6,054,801 to Hunt (Hunt '801).

Xu '444 does not disclose that its field emission device can be used in a lighting system.

Hunt '801 does teach that field emission devices can be used in lighting systems (see column 1, lines 36-45).

It would have been obvious to one of ordinary skill at the time of this invention to use the field emission device in a lighting system as suggested by Hunt '801 as the same materials are being employed.

Claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over USP 5,973,444 to Xu (Xu '444) in view of USP 6,255,198 to Linthicum (Linthicum '198) as applied to claim 30 above, and further in view of USP 6,465,132 to Jin (Jin '132) taken with USP 6,911,767 to Takai (Takai '767).

Xu '444 discloses that the fiber emitter (nanorod) can be a carbide (see column 9, lines 25-32).

Xu '444 does not disclose all of the limitations of the claim.

However, Jin '132 does disclose that the nanowire of its invention can be a nitride (see

abstract for the discussion regarding using the nanowires in a field emission device, see also column 10, lines 32-56, which discloses what materials can be used to make the nanowires).

Takai ‘767 discloses using silicides in field emission devices (see column 12, lines 66-67).

It would have been obvious to use any of these other materials as set forth in Jin ‘132 and/or Takai ‘767 for the nanorods in Xu ‘444 because Jin ‘132 and Takai ‘767 teach that the other materials are effective in field emitter devices.

Claim 37 and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over USP 5,973,444 to Xu (Xu ‘444) in view of USP 6,255,198 to Linthicum (Linthicum ‘198) as applied to claims 30 and 44 above, and further in view of USP 6,376,007 to Rowell (Rowell ‘007).

Xu ‘444 does not disclose the material used for the dielectric layer.

Rowell ‘007 discloses that its dielectric material can be silicon dioxide or silicon nitride.

It would have been obvious to use silicon dioxide or silicon nitride as the dielectric layer in the Xu ‘444 reference because Rowell ‘007 teaches that these materials are dielectric and the substitution of one equivalent for another is well within the skill of the art.

Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over USP 5,973,444 to Xu (Xu ‘444) in view of USP 6,255,198 to Linthicum (Linthicum ‘198) as applied to claim 38 above, and further in view of USP 6,586,093 to Laude (Laude ‘093).

As to claim 41, Xu ‘444 does not disclose the use of nanoribbons in a field emission device.

However, Laude '093 discloses different nanostructures (including nanoribbons, see column 1, lines 7-11) that can be used in field emission devices (see column 4, lines 20-22).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use Xu '444 in a field emission device as the same materials are being employed.

Claims 54-55, and 69-72 are rejected under 35 U.S.C. 103(a) as being unpatentable over USP 5,973,444 to Xu (XU '444) in view of USP 5,406,123 to Narayan (Narayan '123).

As to claim 54, Xu '444 discloses a field emission device comprising a substrate; a dielectric layer; a conductive layer (in the Xu '444 reference, the conductive layer is called a patterned gate metal film); and carbon fiber emitters (nanorods) (see abstract and column 5, lines 24-30, see also figure 1 and column 14, lines 40-43). As can be seen in Figure 1, Xu '444 discloses a cavity extending downwardly.

However, Xu '444 does not teach a polycrystalline diffusion barrier affixed to the top of the side of the substrate.

Narayan '123 teaches that titanium nitride films and coatings having polycrystalline structure have applications such as diffusion barriers in integrated circuit devices.

As such, it would have been obvious to one of ordinary skill in the art at the time of this invention to add a polycrystalline diffusion barrier to the top of the substrate in Xu '444 in order to prevent diffusion or to retard the inter-diffusion of the two superposed metals.

As to claim 55, Xu '444 discloses a field emission device comprising a substrate (see abstract and column 5, lines 24-30, see also figure 1) that can be an inorganic monocrystalline

substance (see column 6, lines 33-35). Specifically, a silicon wafer can be used (see column 20, lines 12-14). As can be seen in Figure 1, there are several nanostructures extending from the substrate. Xu '444 discloses that these nanostructures are carburized metal (referred to as carbon fiber emitters) (see column 9, lines 25-32).

However, Xu '444 does not teach a polycrystalline diffusion barrier affixed to the top of the side of the substrate.

Narayan '123 teaches that titanium nitride films and coatings having polycrystalline structure have applications such as diffusion barriers in integrated circuit devices.

As such, it would have been obvious to one of ordinary skill in the art at the time of this invention to add a polycrystalline diffusion barrier to the top of the substrate in Xu '444 in order to prevent diffusion or to retard the inter-diffusion of the two superposed metals.

Claims 30, 35, 36, 38-40, 42-51, and 56-68 are rejected under 35 U.S.C. 103(a) as being unpatentable over USP 5,973,444 to Xu (Xu '444) in view of US 2002/0198112 to Paranthaman (Paranthaman '112).

As to claims 30, 38, and 40, Xu '444 discloses a field emission device comprising a substrate; a dielectric layer; a conductive layer (in the Xu '444 reference, the conductive layer is called a patterned gate metal film); and carbon fiber emitters (nanorods) (see abstract and column 5, lines 24-30, see also figure 1 and column 14, lines 40-43). As can be seen in Figure 1, Xu '444 discloses a cavity extending downwardly. Xu '444 teaches a conductive resistor layer on top of the substrate (see column 6, lines 11-29).

However, Xu ‘444 does not teach that the resistor layer is a conductive epitaxial layer.

Paranthaman ‘112 discloses a epitaxial article having a substrate and a conductive epitaxial buffer layer and an active layer (see paragraph 0035).

It would have been obvious to one of ordinary skill in the art at the time of this invention to use a conductive epitaxial buffer layer (as in Paranthaman ‘112 on the substrate of Xu ‘444 because Paranthaman ‘112 teaches that the use of epitaxial layers permit the formation of improved devices (see Paranthaman ‘122, paragraph 0004). Further, the conductive epitaxial layer would serve the same function as the layer of Xu ‘444, which desires a conductive layer in order to ensure that lost electrons are replaced (see Xu ‘444, column 6, lines 11-13). The conductive epitaxial layer is expected to remain.

As to claim 44, Xu ‘444 discloses a field emission device comprising a substrate; a dielectric layer; a conductive layer (in the Xu ‘444 reference, the conductive layer is called a patterned gate metal film); Xu ‘444 discloses a catalyst metal film (since the catalyst is metal, it will serve as a conductive platform) on top of the substrate; with carbon fiber emitters (nanorods) on the metal (see abstract and column 5, lines 24-30, see also figure 1 and column 14, lines 40-43). As can be seen in Figure 1, Xu ‘444 discloses a cavity extending downwardly.

With regard to claims 35 and 48, the substrate of Xu ‘444 can be an inorganic monocrystalline substance (see column 6, lines 33-35). Specifically, a silicon wafer can be used (see column 20, lines 12-14).

As to claim 42, Xu ‘444 discloses carbon fiber emitters having diameters of 20-100 nm (see column 19 lines 65-67).

As to claim 43, Xu '444 discloses carburized metal (referred to as carbon fiber emitters) (see column 9, lines 25-32). Xu '444 teaches a silicon carbide (see column 9, lines 30-31).

Although Xu '444 does not disclose where the carburized metal is from, it would have been obvious to use any of the metal oxides claimed in the present invention to provide the carburized metals. As to claim 45, Xu '444 discloses a structure on top of the substrate, which can be a cone (see column 14, lines 22-32). As to claim 46, Xu '444 teaches that the catalyst (the conductive layer) can be a transition metal, including molybdenum, platinum, palladium and niobium (see column 9, lines 26-39). As to claim 47, Xu '444 discloses that the fiber emitter (nanorod) can be a carbide (see column 9, lines 25-32). As to claims 50 and 51, Xu '444 discloses that the substrate can be a polycrystalline material or a glassy amorphous material (see column 6, lines 34-37).

As to claims 36, 39 and 49, Xu '444 teaches that any of the monocrystalline substances would work as the substrate (see column 6, lines 34-37). Therefore, it would have been obvious to one of ordinary skill in the art to select any of the monocrystalline substances for the substrate.

Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over over USP 5,973,444 to Xu (Xu '444) in view of US 2002/0198112 to Paranthaman (paranthaman '112) as applied to claim 30 above, and further in view of USP 5,157,304 to Kane (Kane '304).

Xu '444 does not disclose that its field emission device can be used in imaging systems. Kane '304 does teach that field emission devices can be used in imaging systems (see column 1, lines 12-24). It would have been obvious to one of ordinary skill at the time of this invention to

use the field emission device in an imaging system as suggested by Kane ‘304 as the same materials are being employed.

Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over USP 5,973,444 to Xu (Xu ‘444) in view of US 2002/0198112 to Paranthaman (Paranthaman ‘112) as applied to claim 30 above, and further in view of USP 6,054,801 to Hunt (Hunt ‘801).

Xu ‘444 does not disclose that its field emission device can be used in a lighting system. Hunt ‘801 does teach that field emission devices can be used in lighting systems (see column 1, lines 36-45). It would have been obvious to one of ordinary skill at the time of this invention to use the field emission device in a lighting system as suggested by Hunt ‘801 as the same materials are being employed.

Claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over USP 5,973,444 to Xu (Xu ‘444) in view of US 2002/0198112 to Paranthaman (Paranthaman ‘112) as applied to claim 30 above, and further in view of USP 6,465,132 to Jin (Jin ‘132) taken with USP 6,911,767 to Takai (Takai ‘767).

Xu ‘444 discloses that the fiber emitter (nanorod) can be a carbide (see column 9, lines 25-32).

Xu ‘444 does not disclose all of the limitations of the claim.

However, Jin ‘132 does disclose that the nanowire of its invention can be a nitride (see abstract for the discussion regarding using the nanowires in a field emission device, see also column 10, lines 32-56, which discloses what materials can be used to make the nanowires).

Takai '767 discloses using silicides in field emission devices (see column 12, lines 66-67).

It would have been obvious to use any of these other materials for the nanorods in the present filed emission device because the references teach that the other materials are effective in field emitter devices.

Claim 37 and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over USP 5,973,444 to Xu (Xu '444) in view of US 2002/0198112 to Paranthaman (Paranthaman '112) as applied to claims 30 and 44 above, and further in view of USP 6,376,007 to Rowell (Rowell '007).

Xu '444 does not disclose the material used for the dielectric layer. Rowell '007 discloses that its dielectric material can be silicon dioxide or silicon nitride.

It would have been obvious to use silicon dioxide or silicon nitride as the dielectric layer in the Xu '444 reference because Rowell '007 teaches that these materials are dielectric.

Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over USP 5,973,444 to Xu (Xu '444) in view of US 2002/0198112 to Paranthaman (Paranthaman '112) as applied to claim 38 above, and further in view of USP 6,586,093 to Laude (Laude '093).

As to claim 41, Xu '444 does not disclose the use of nanoribbons in a field emission device.

However, Laude '093 discloses different nanostructures (including nanoribbons, see column 1, lines 7-11) that can be used in field emission devices (see column 4, lines 20-22).

Claims 54 and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over USP 5,973,444 to Xu (Xu '444) in view of USP 5,406,123 to Narayan (Narayan '123).

As to claim 54, Xu '444 discloses a field emission device comprising a substrate; a dielectric layer; a conductive layer (in the Xu reference, the conductive layer is called a patterned gate metal film); and carbon fiber emitters (nanorods) (see abstract and column 5, lines 24-30, see also figure 1 and column 14, lines 40-43). As can be seen in Figure 1, Xu '444 discloses a cavity extending downwardly.

However, Xu '444 does not teach a conductive polycrystalline diffusion barrier affixed to the top of the side of the substrate.

Narayan '123 teaches that titanium nitride (titanium nitride is known to be conductive) films and coatings having polycrystalline structure have applications such as diffusion barriers in integrated circuit devices.

As such, it would have been obvious to one of ordinary skill in the art at the time of this invention to add a polycrystalline diffusion barrier to the top of the substrate in Xu '444 in order to prevent diffusion or to retard the inter-diffusion of the two superposed metals.

As to claim 55, Xu '444 discloses a field emission device comprising a substrate (see abstract and column 5, lines 24-30, see also figure 1) that can be an inorganic monocrystalline substance (see column 6, lines 33-35). Specifically, a silicon wafer can be used (see column 20, lines 12-14). As can be seen in Figure 1, there are several nanostructures extending from the substrate. Xu '444 discloses that these nanostructures are carburized metal (referred to as carbon fiber emitters) (see column 9, lines 25-32).

However, Xu ‘444 does not teach a conductive polycrystalline diffusion barrier affixed to the top of the side of the substrate.

Narayan ‘123 teaches that titanium nitride films (titanium nitride is known to be conductive) and coatings having polycrystalline structure have applications such as diffusion barriers in integrated circuit devices.

As such, it would have been obvious to one of ordinary skill in the art at the time of this invention to add a polycrystalline diffusion barrier to the top of the substrate in Xu ‘444 in order to prevent diffusion or to retard the inter-diffusion of the two superposed metals.

(10) Response to Argument

A. Ground of Rejection Number 1:

1. Legal Precedent

Appellants devote two paragraphs to claim construction, citing a number of cases including *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005). Appellants fail to recognize the portion of the *Phillips* opinion which sets forth claim construction during prosecution. *See Phillis*, 415 F.3d at 1316 ("The Patent and Trademark Office ("PTO") determines the scope of the claims in patent applications not solely on the basis of the claim language, but upon giving claims their *broadest* reasonable construction “in light of the specification as it would be interpreted by one of ordinary skill in the art.") (emphasis added, citations omitted). Patent prosecution is not a *Markman* hearing, and public policy favors broad claim interpretation during prosecution. *See* MPEP 2111 (“Applicant always has the opportunity to amend the claims during prosecution, and broad interpretation by the examiner reduces the possibility that the claim, once

issued, will be interpreted more broadly than is justified," *citing In re Prater*, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-51 (CCPA 1969)). Thus, if Appellants are not claiming what they did or what they want to exclude others from doing (making, using, selling, offering to sell, etc.), they have had ample opportunities to do so – for example at filing or throughout prosecution.

As to the case law cited to with respect to obviousness, the Board should note that the hypothetical person of ordinary skill in the art "is also a person of ordinary creativity, not an automaton." *KSR International Co. v. Teleflex, Inc.*, 550 US __, 82 USPQ 1385, 1397 (U.S. 2007). Nowhere is this truer than in the field of nanotechnology – a highly skilled, cross-disciplinary field.

2. Independent claim 30 and its dependent claims

Appellants' arguments with respect to the rejection of Claim 30 are not persuasive. Figure 1 of Xu '444 and the accompanying text very clearly discloses a conductive layer. *See e.g.* (Xu '444 "Fig 1") *and* (Xu '444 5: 31) ("catalyst metal film 14"). This was stated in numerous prior office actions and Appellants continue to ignore it. Even if Xu '444 teaches the features Appellants say it does in their brief, this has absolutely no relevance to patentability, as they are not excluded by the claims. Thus, the arguments are not commensurate in scope with what is instantly claimed i.e. the claims are broader in scope than what Appellant is arguing. *See* MPEP 2111.03 Transitional Phrases (noting the definition of "comprising" does not exclude additional, unrecited elements or method steps).

Appellants further argue that Xu '444 does not teach a catalyst film remaining after formation of nanorods. (Br. at 14, 2d full paragraph). Again, Appellants continue to ignore

"Figure 1" of Xu '444 which quite clearly shows nanorods (i.e. nanorods that have been formed) atop the layer. To the extent Xu '444 may not teach an epitaxial layer, and to the extent motivation to use an epitaxial layer is needed, Linthicum '198 provides both. *See* (Linthicum '198 1: 54-60) (noting the reduction in defect density). Appellants fail to address this motivation. Reduction of defects in a conducting layer "results in a product . . . that is more desirable, for example because it is stronger, cheaper, cleaner, faster, lighter, smaller, more durable or more efficient." *Dystar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1368, 80 USPQ2d 1641, 1651 (Fed. Cir. 2006). Indeed, "improving a product" by removing defects is "common-sensical," because of the opportunity to "enhance commercial opportunities." *Id.*

3. Independent Claim 38 and its dependent claims

Appellants argue Xu '444 fails to teach catalyst particles between the buffer layer and the nanostructure. (Br. at 15, 5th paragraph). Xu '444 does in fact teach this. *See* (Xu '444 9: 25 *et seq*) (noting that the fiber can contain portions of the catalyst). This teaching is exemplary of what is well known in the art, namely the nanotube/fiber grows from a catalyst and the catalyst remains at the end of the tube/fiber, i.e. "disposed between" the nanostructure and the conductive layer. This is how you grow carbon fibers/nanotubes.

4. Independent Claim 44 and its dependent claims

Appellants again mistake patent prosecution for a *Markman* hearing. All that is required of the argued features of Claim 4 is a platform (i.e. something raised above something else) with

a catalyst on it, inside something else (i.e. a channel). Clearly any number of figures in Xu '444 satisfy this. *See e.g.* (Xu '444 "Fig. 9").

B–F. Grounds of Rejection 2-6:

Appellants' arguments directed to rejections of dependent claims rely on alleged deficiencies in the rejections of the independent claims. These arguments are believed to be addressed *supra*.

G. Ground of Rejection Number 7:

1. Independent Claim 54 and its dependent claims

As to Claim 54, Appellants do not address the secondary reference, relying solely on the alleged failings of Xu '444 alone. One cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

2. Independent Claim 55 and its dependent claims

Appellants do not address the motivation enunciated with respect to Claim 55, and continue to argue the references in an impermissible piecemeal fashion. As noted above, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

H. Ground of Rejection Number 8:

1. Independent claim 30 and its dependent claims

As noted above, Appellants either address features in Xu ‘444 not claimed or do not address Figure 1 of Xu ‘444, as referenced in prior office actions. Figure 1 clearly discloses nanofibers on top of a conductive layer. *See supra* at A. 2. Furthermore, Appellants do not address the motivation enunciated in the office action, specifically the crystallographic correlation of the layer with the underlying substrate, “permitting the formation of improved devices.” (Paranthaman ‘112 1: [0004]). Again, as noted above, “improving a product” is “common-sensical,” because of the opportunity to “enhance commercial opportunities.” *Dystar*, 464 F.3d at 1368, 80 USPQ2d at 1651.

2. Independent claim 38 and its dependent claim.

Appellants argue Xu ‘444 fails to teach catalyst particles between the buffer layer and the nanostructure. (Br. at 24, 5th paragraph). Xu ‘444 does in fact teach this. *See* (Xu ‘444 9: 25 *et seq*) (noting that the fiber can contain portions of the catalyst). This teaching is exemplary of what is well known in the art, namely the nanotube/fiber grows from a catalyst and the catalyst remains at the end of the tube/fiber, i.e. “disposed between” the nanostructure and the conductive layer. This is how you grow carbon fibers.

3. Independent claim 44 and its dependent claims

Appellants again mistake patent prosecution for a *Markman* hearing. All that is required of Claim 4 is a platform (i.e. something raised above something else) with a catalyst on it, inside something else (i.e. a channel). Clearly any number of figures in Xu '444 satisfy this. *See e.g.* (Xu '444 "Fig. 9").

I-N Grounds of Rejection 9-14:

Appellants' arguments directed to rejections of dependent claims rely on alleged deficiencies in the rejections of the independent claims. These arguments are believed to be addressed *supra*.

Conclusion:

Claims are given their broadest reasonable interpretation. MPEP 2111. While the temptation exists to differentiate one thing from another based on a picture in the specification, a embodiment, etc., it is *the claims* that define the right to exclude, not the specification. Further, "that claims are interpreted in light of the specification does not mean that everything expressed in the specification must be read into all the claims." *Raytheon Co. v. Roper Corp.*, 724 F.2d 951, 957 (Fed. Cir. 1983). The Examiner respectfully submits that is what Applicants attempt here.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Daniel C. McCracken/

Examiner, Art Unit 1793

Conferees:

/Kathryn Gorgos/

Kathryn Gorgos

Appeals Specialist

/Stanley Silverman/

Supervisory Patent Examiner, Art Unit 1793